

# KASI Combination Center Report

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## Abstract

This report introduces the activities of the Korea Astronomy and Space Science Institute (KASI) as an IVS Combination Center and shows the current status of the combination work. It also outlines the intended tasks for 2011.

## 1. General Information

KASI was accepted as an IVS Combination Center on October 21, 2008. The KASI Headquarters is located in the Daeduk Research and Development Complex, Daejeon. Currently, the KASI Space Geodesy Research Group mainly works on the application and the combination of space geodetic techniques.

## 2. Component Description

The mission of the KASI Combination Center is:

- to create high quality combination products
- to control the quality of the Analysis Centers' results
- to provide feedback to the Analysis Centers
- to adhere to the IERS Conventions

## 3. Staff

Table 1. Personnel at the KASI Combination Center.

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## 4. Current Status and Activities

(1) The Bernese S/W for IVS combination:

For combination analysis, we use the Bernese S/W 5.0 which is a GPS data processing program. The Bernese S/W provides the functions of stacking normal equations and estimating parameters. The input to the Bernese S/W is the Normal Equation (N.E.) Matrix and the N.E. vector from the daily SINEX files of the individual ACs, which is the same input that the BKG/DGFI Combination Center uses. The output are daily SINEX files with combined station coordinates and

Earth Orientation Parameters (EOP).

(2) Validation of Bernese S/W:

We presented the preliminary combination results at the IVS General Meeting. While TRF accuracy was within general IVS accuracy [1], some of the EOP looked biased [2]. The Analysis Coordinator advised us to reanalyze the individual solutions to validate the S/W. We reanalyzed the CONT08 solutions of BKG, GSFC, and OPA for X-pole, Y-pole, UT1-UTC, and their rates. Since the EOP series were not provided from USNO for this period, USNO was excluded. IAA and DGFI were also excluded, because their SINEX format file could not be processed in Bernese S/W. Figure 1 shows the reanalyzed BKG EOP minus the original EOP from BKG, the original EOP from BKG minus the three AC combined EOP, and the reanalyzed BKG EOP minus the three AC combined EOP, respectively. Figure 2 shows the differences between each AC's solution and the combined solution.

## 5. Future Plans

After completing verification of the Bernese S/W, we will produce NQ0 format files (input format files Bernese S/W handles) for DGFI and IAA to combine all of the ACs' products. We will also establish the automated combination processing with the Bernese Processing Engine (BPE). This automated processing will produce an IVS combination solution for the whole period (1984 to present) easily and rapidly.

## References

- [1] Harald Schuh, Patrick Charlot, Hayo Hase, Ed Himwich, Kerry Kingham, Calvin Klatt, Chopo Ma, Zinovy Malkin, Arthur Niell, Axel Nothnagel, Wolfgang Schlüter, Kazuhiro Takashima, Nancy Vandenberg, Final Report of IVS Working Group 2 for Product Specification and Observing Programs, 2001.
- [2] Younghee Kwak, Jungho Cho, in International VLBI Service for Geodesy and Astrometry 2009 Annual Report, edited by D. Behrend and K. Bayer, NASA/TP-2010-215860, 2010.

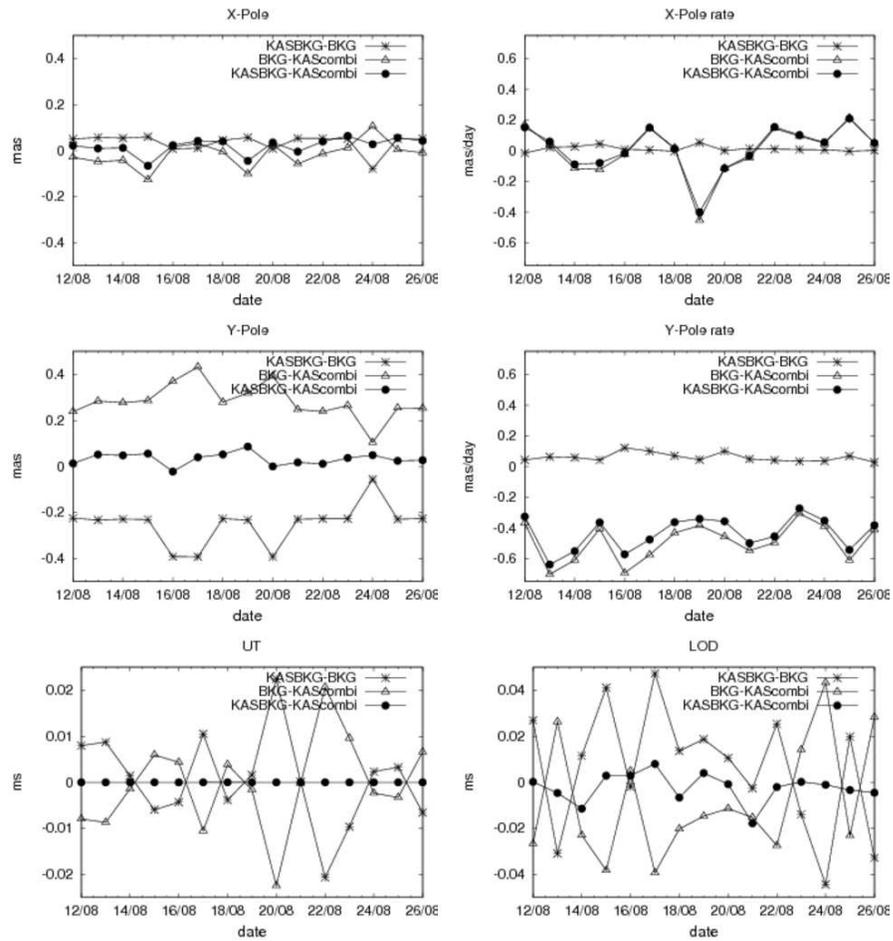


Figure 1. The differences between the reanalyzed BKG EOP (KASBKG) and the original EOP from BKG (BKG), the differences between the original EOP from BKG (BKG) and the three AC combined EOP (KAScombi), and the differences between the reanalyzed BKG EOP (KASBKG) and the three AC combined EOP (KAScombi).

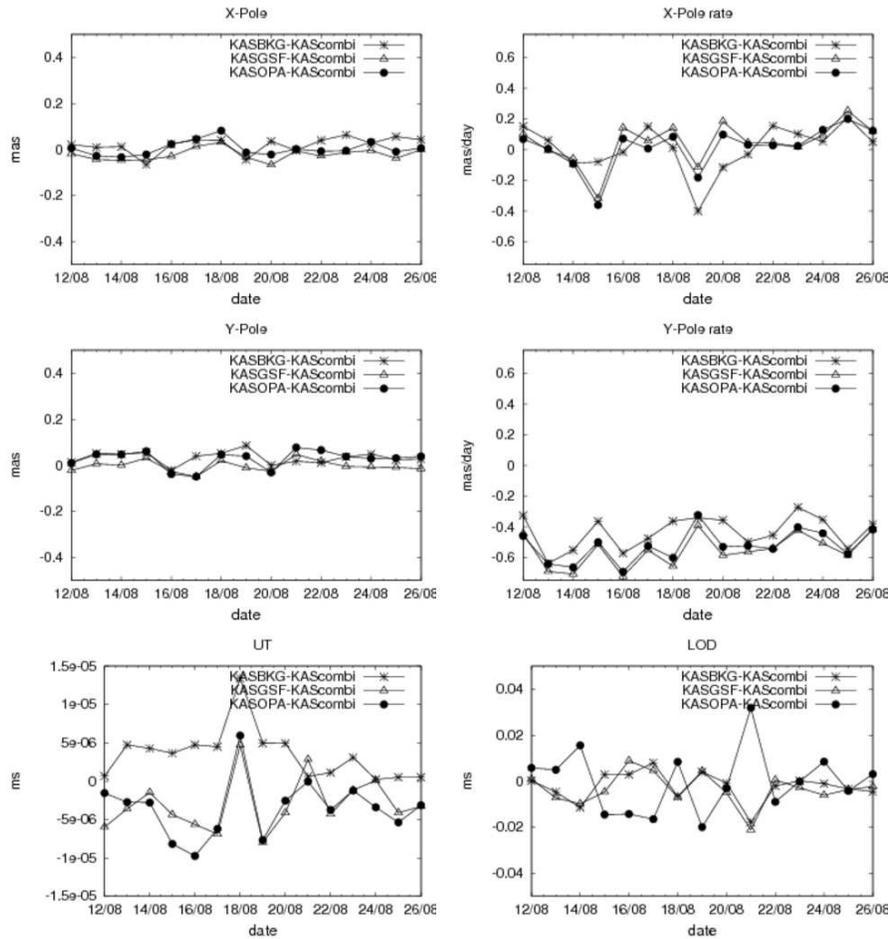


Figure 2. The residuals of each AC's reanalyzed EOP solution with respect to the three AC combined EOP (KAScombi). Here, KASBKG, KASGSF, and KASOPA mean the reanalyzed BKG EOP, GSF EOP, and OPA EOP, respectively.